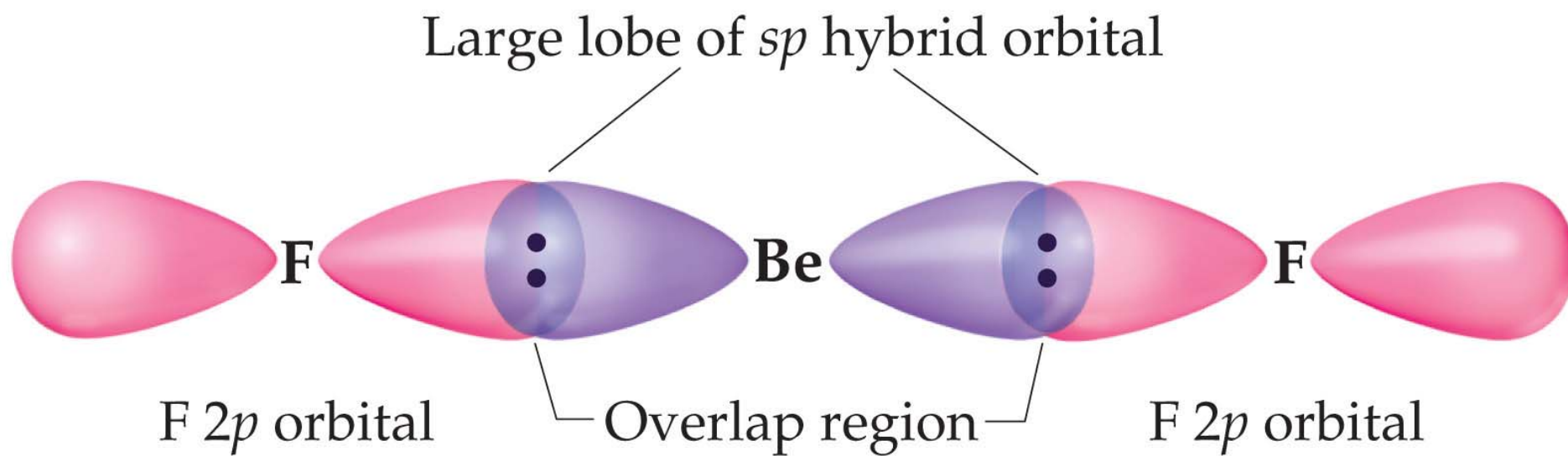
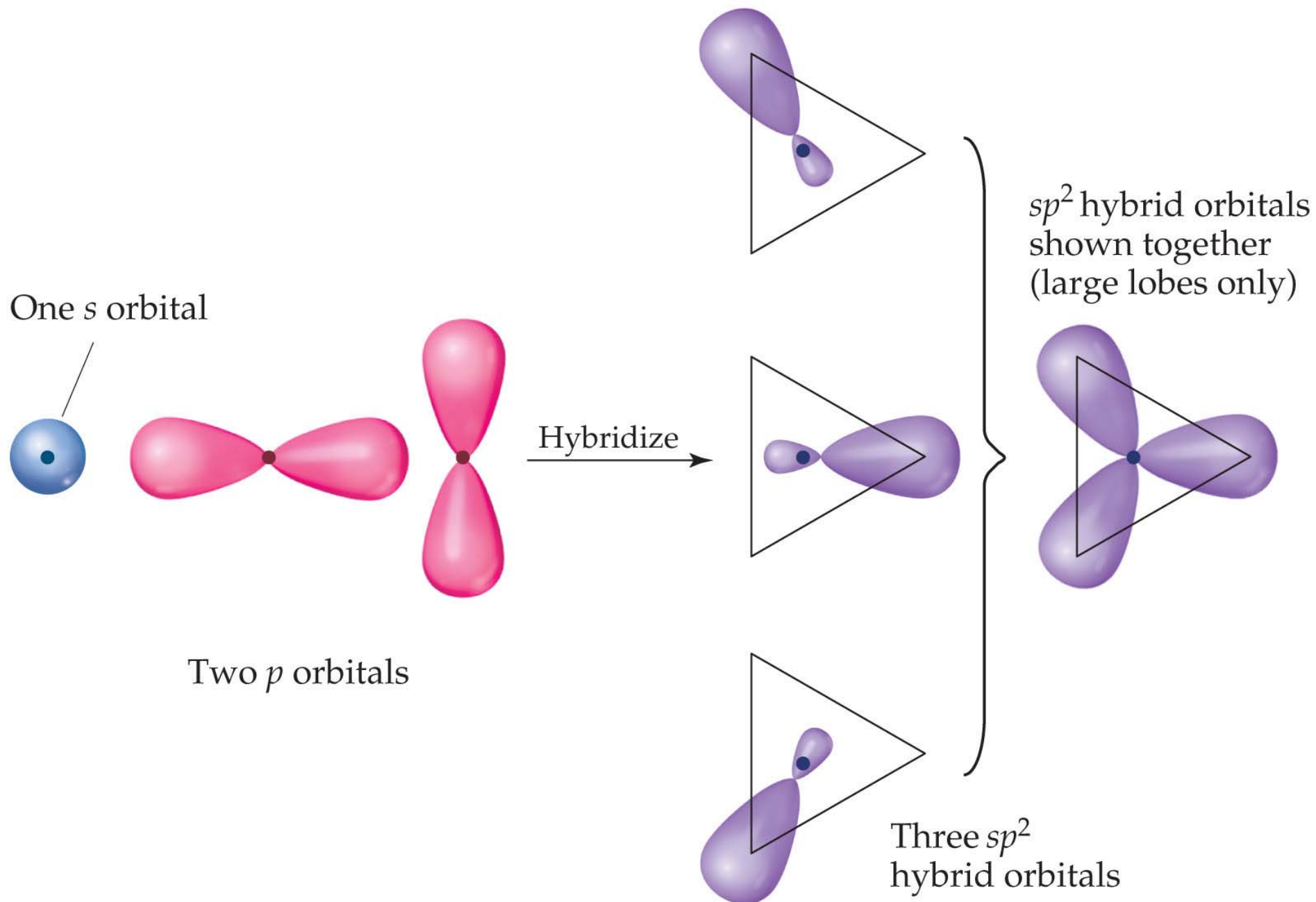
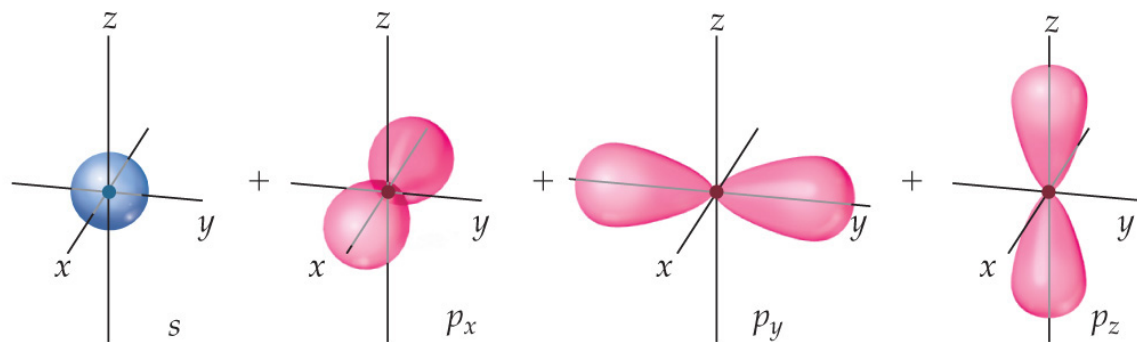


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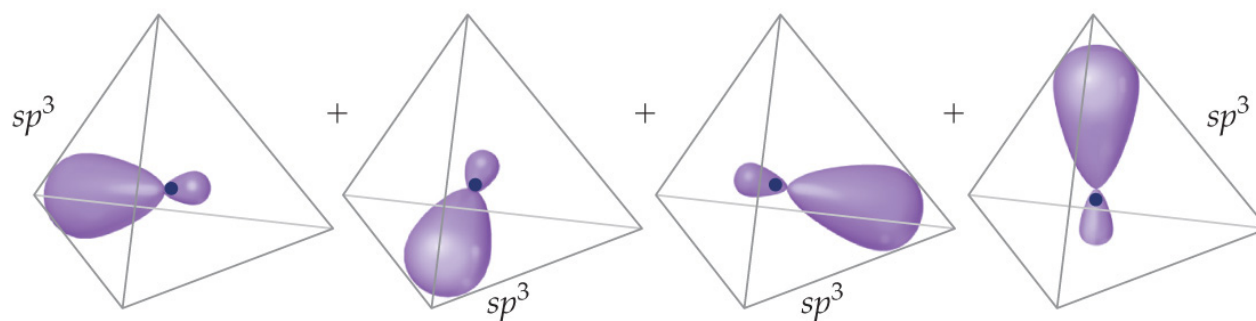


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Hybridize to form four sp^3 hybrid orbitals



Shown together (large lobes only)

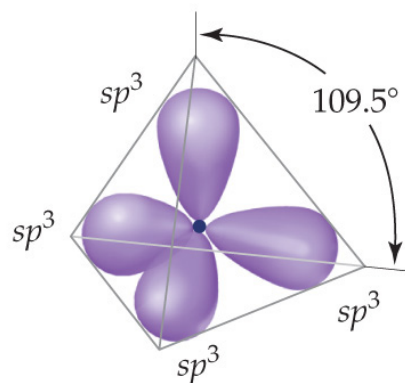
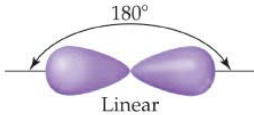
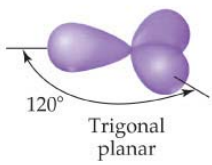
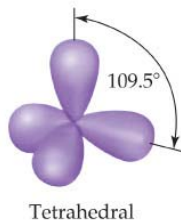
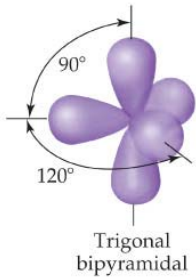
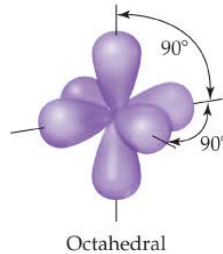
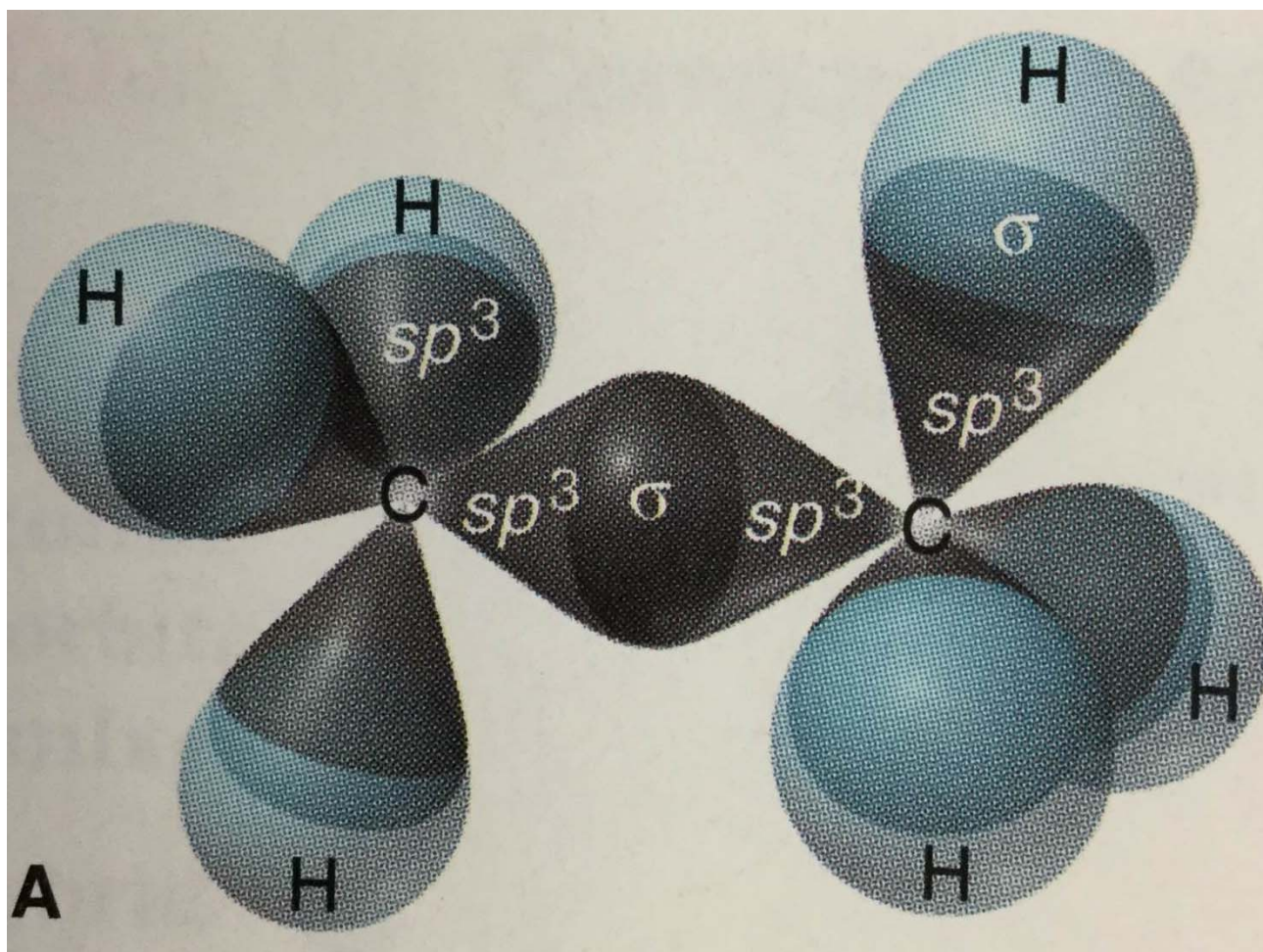
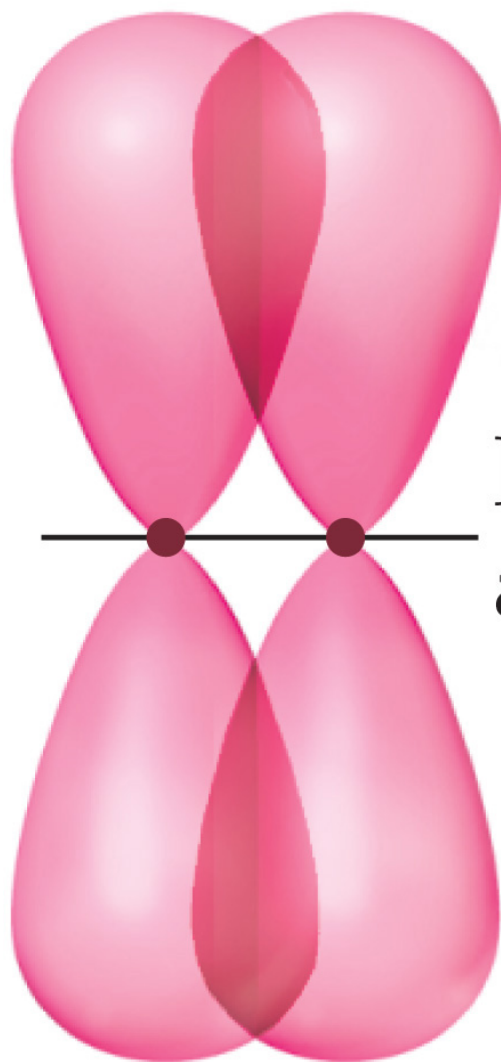


TABLE 9.4 ■ Geometric Arrangements Characteristic of Hybrid Orbital Sets

Atomic Orbital Set	Hybrid Orbital Set	Geometry	Examples
s, p	Two sp	 <p>Linear</p>	BeF_2 , HgCl_2
s, p, p	Three sp^2	 <p>Trigonal planar</p>	BF_3 , SO_3
s, p, p, p	Four sp^3	 <p>Tetrahedral</p>	CH_4 , NH_3 , H_2O , NH_4^+
s, p, p, p, d	Five sp^3d	 <p>Trigonal bipyramidal</p>	PF_5 , SF_4 , BrF_3
s, p, p, p, d, d	Six sp^3d^2	 <p>Octahedral</p>	SF_6 , ClF_5 , XeF_4 , PF_6^-

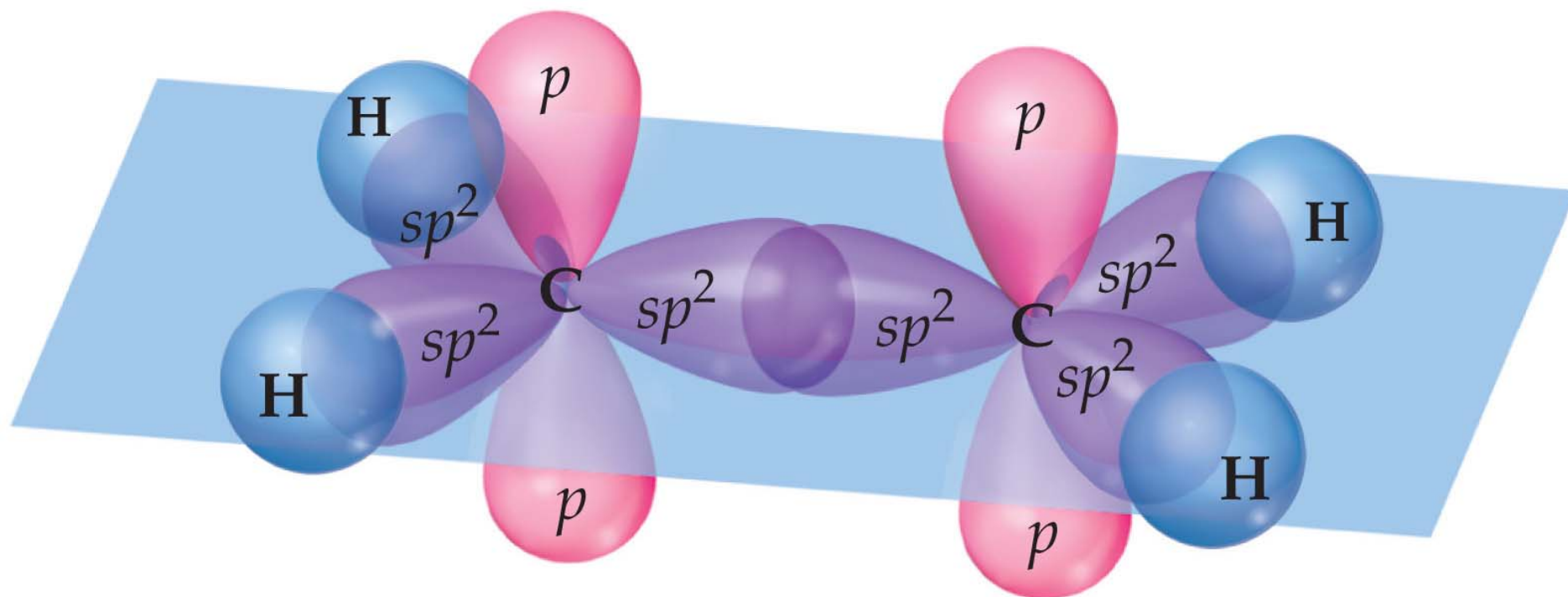


π bond

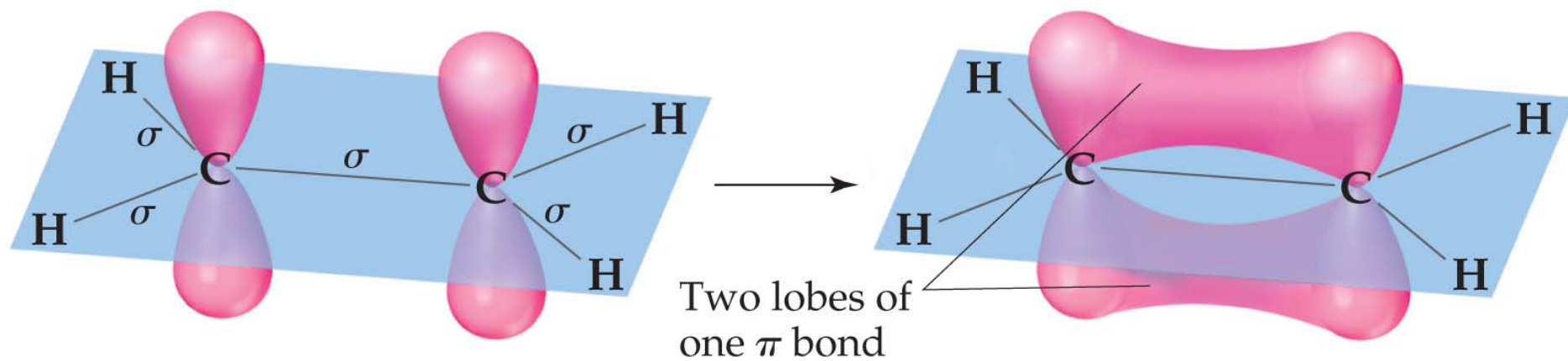


Internuclear
axis

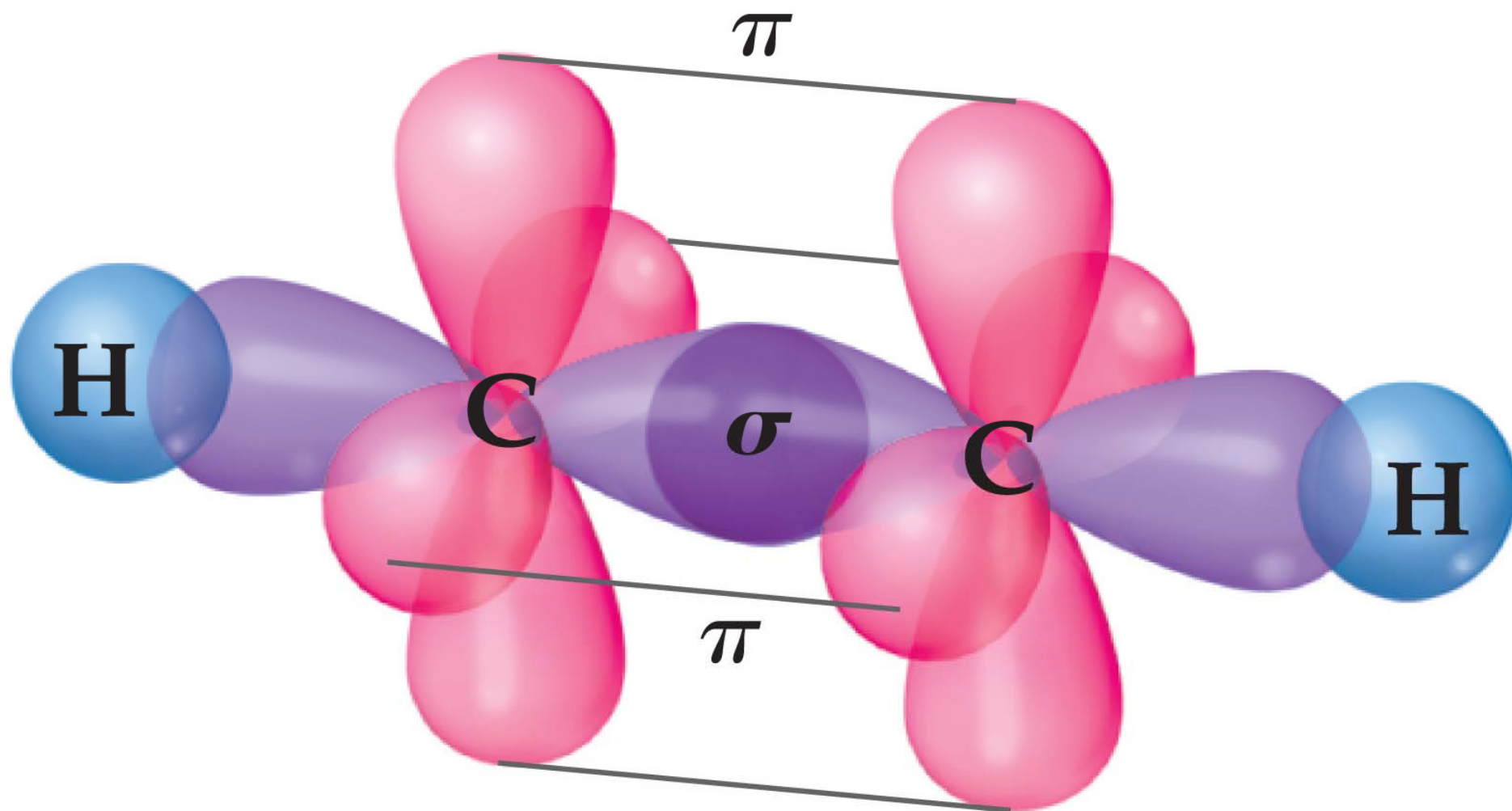
p p



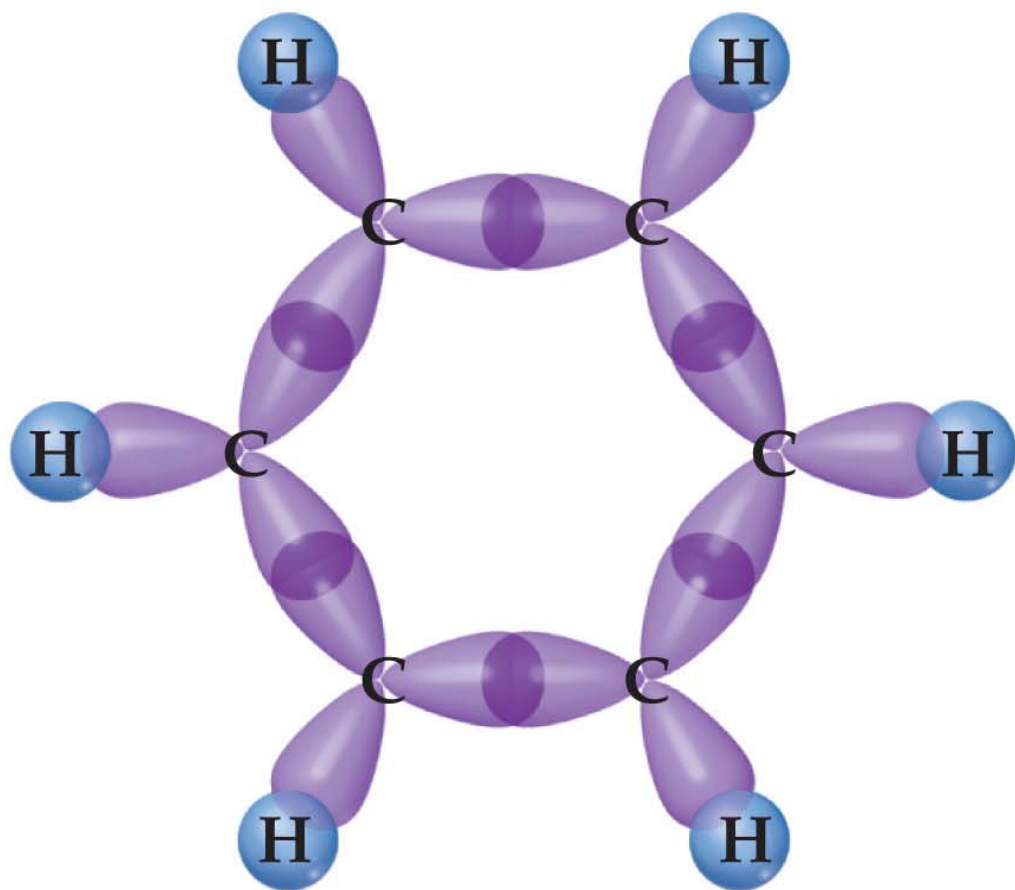
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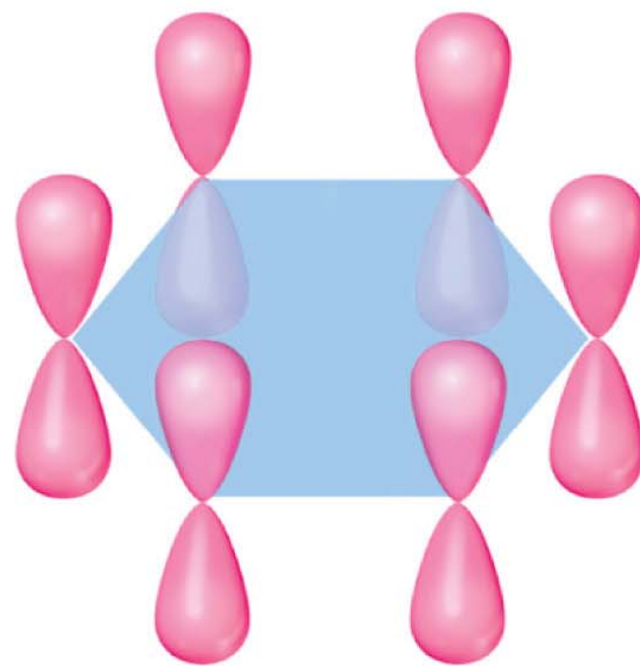
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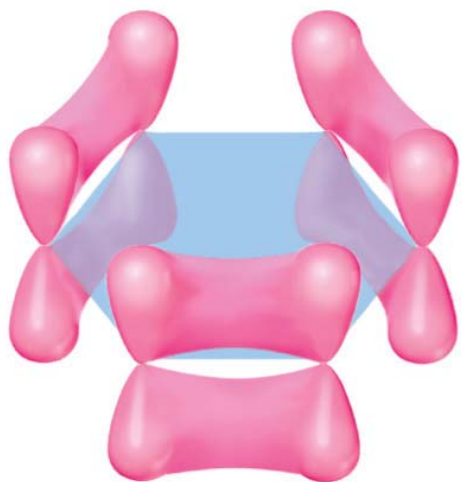
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(a) σ bonds



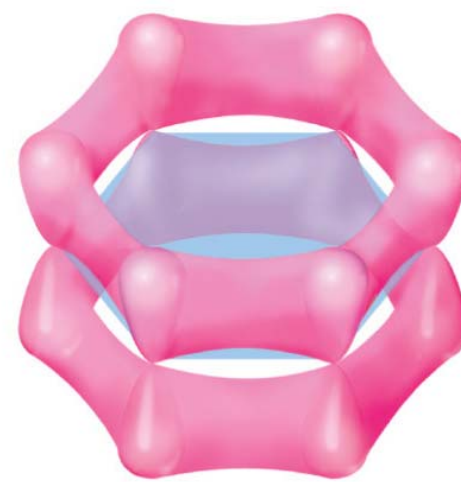
(b) $2p$ atomic orbitals



(a) Localized π bonds

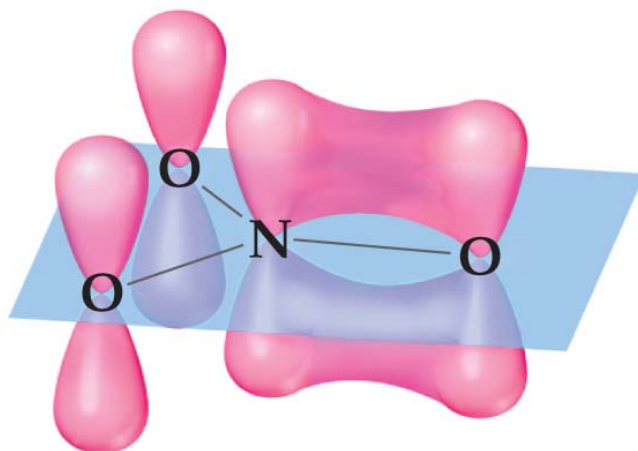


(b) Localized π bonds

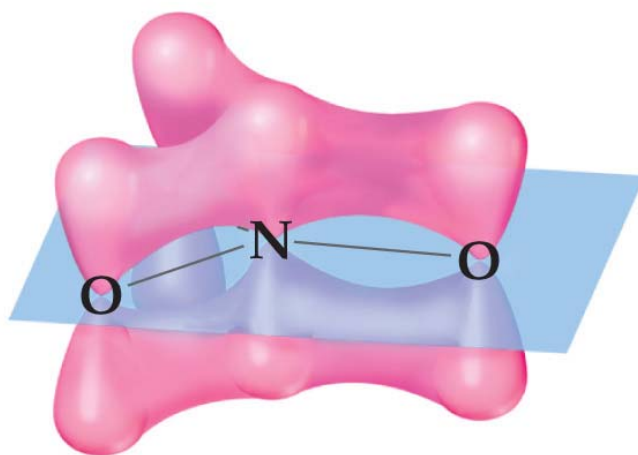


(c) Delocalized π bonds

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(a) N—O π bond in one of the resonance structures of NO_3^- .



(b) Delocalization of the π bonds in the NO_3^- ion.